# IMPROVING PLANT PERFORMANCE

## A STRATEGIC APPROACH

11th November 2004

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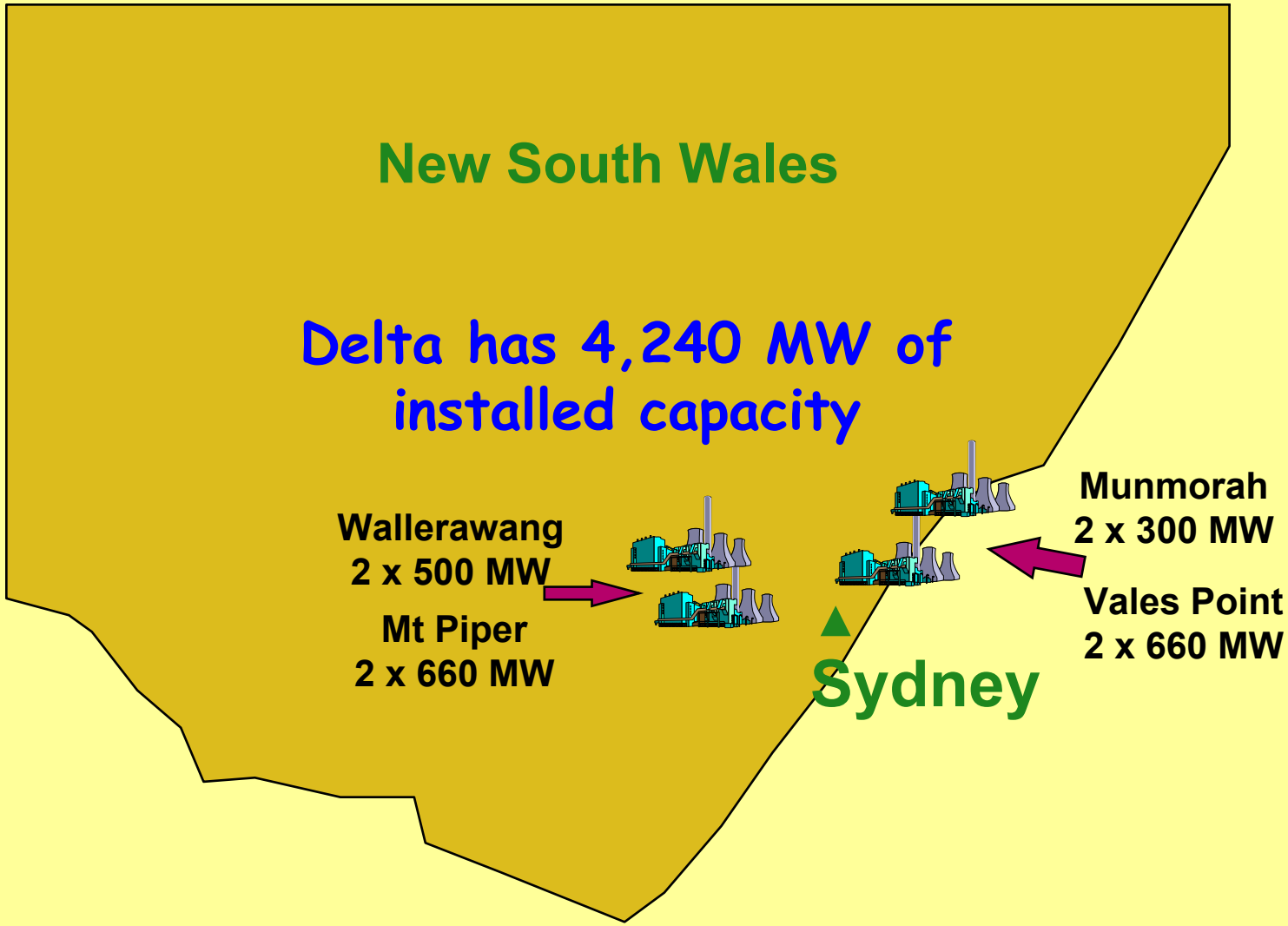
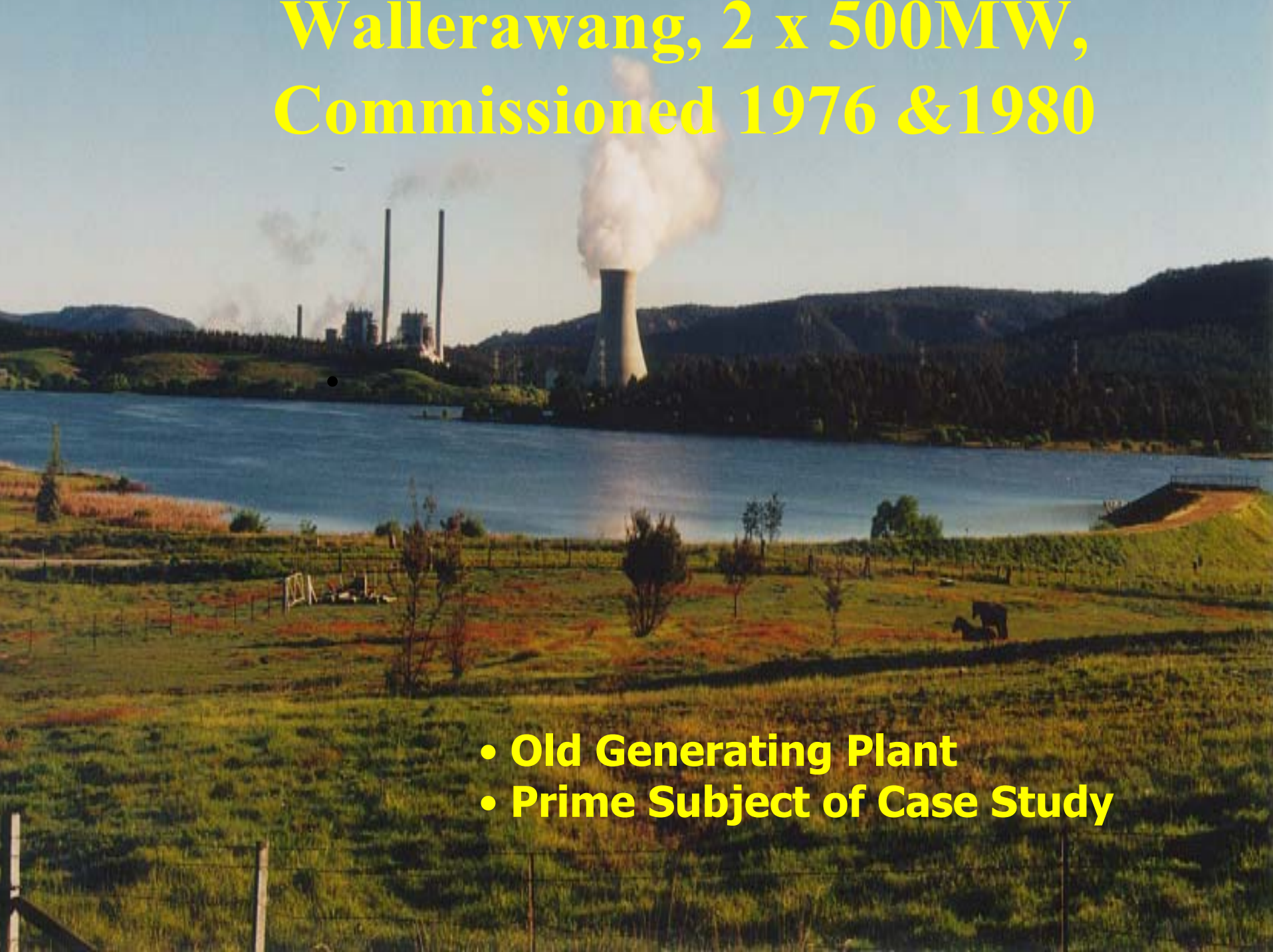
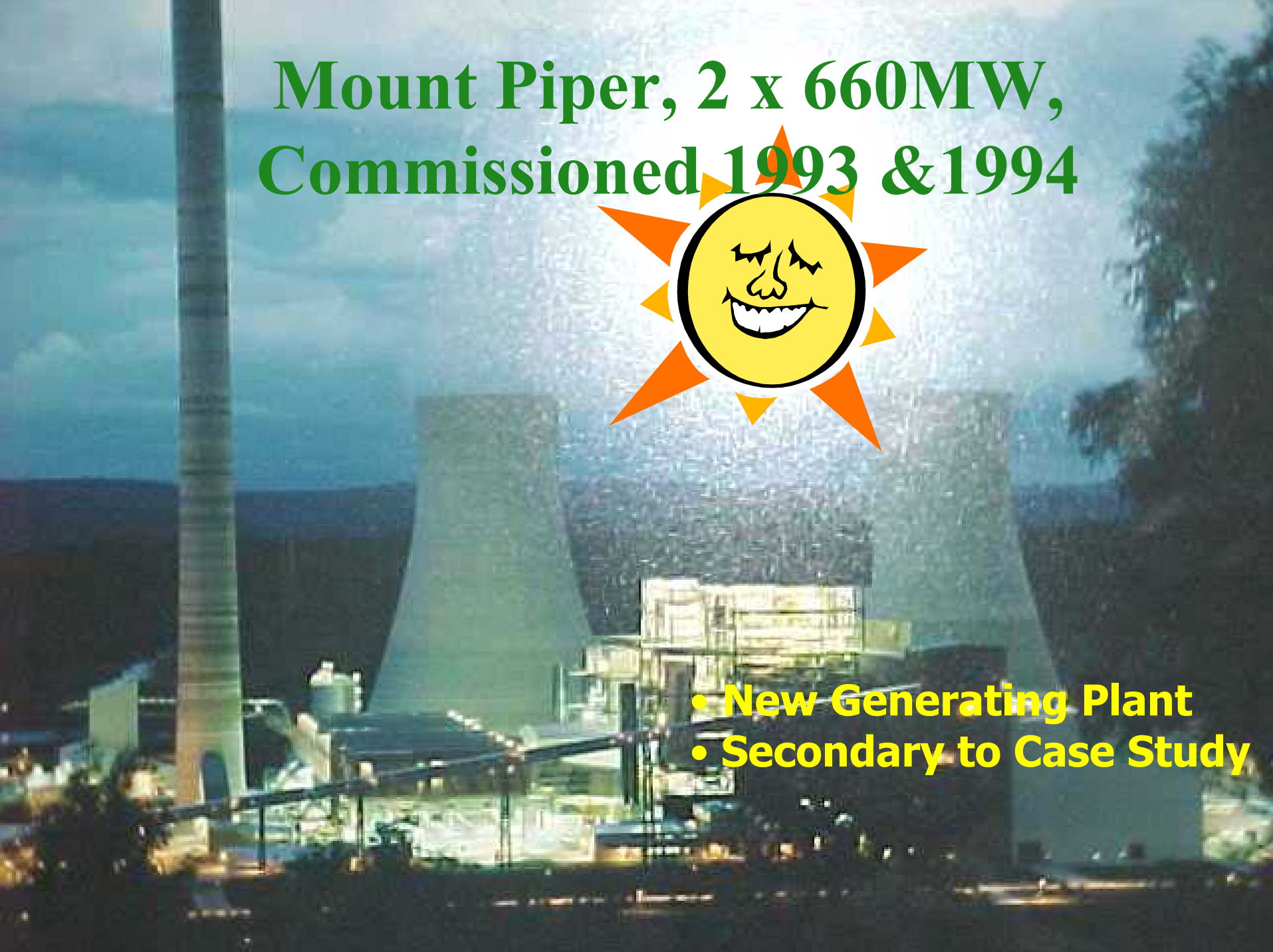
Delta Electricity

# Delta Electricity Power Stations

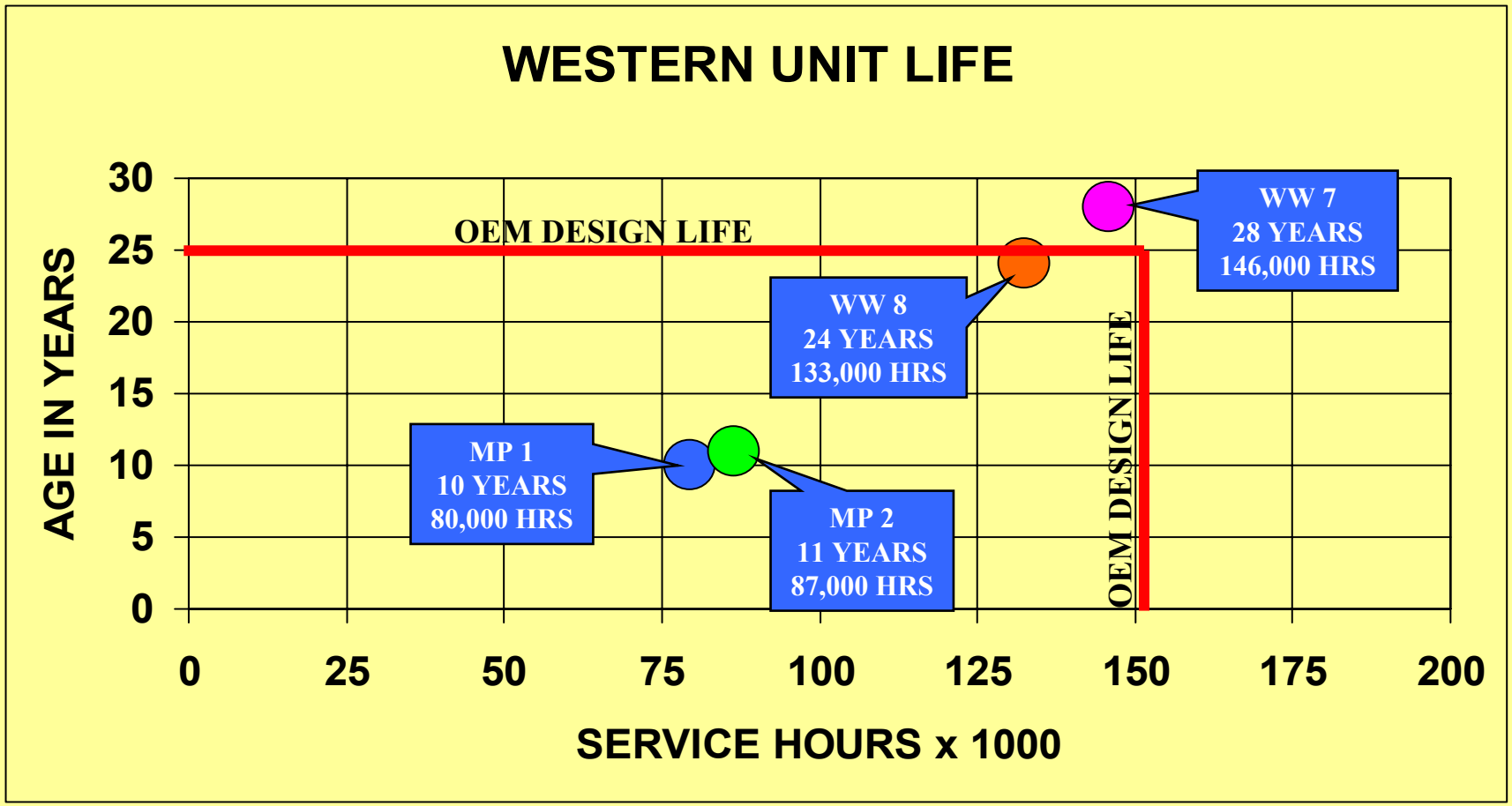



Wallerawang, 2 x 500MW,
Commissioned 1976 &1980
• Old Generating Plant
• Prime Subject of Case Study


ONE
WAY
FORWARD


Mount Piper, 2 x 660MW,
Commissioned 1993 &1994
• New Generating Plant
• Secondary to Case Study

# Western Plant Age and Life



# Plant Performance Measures

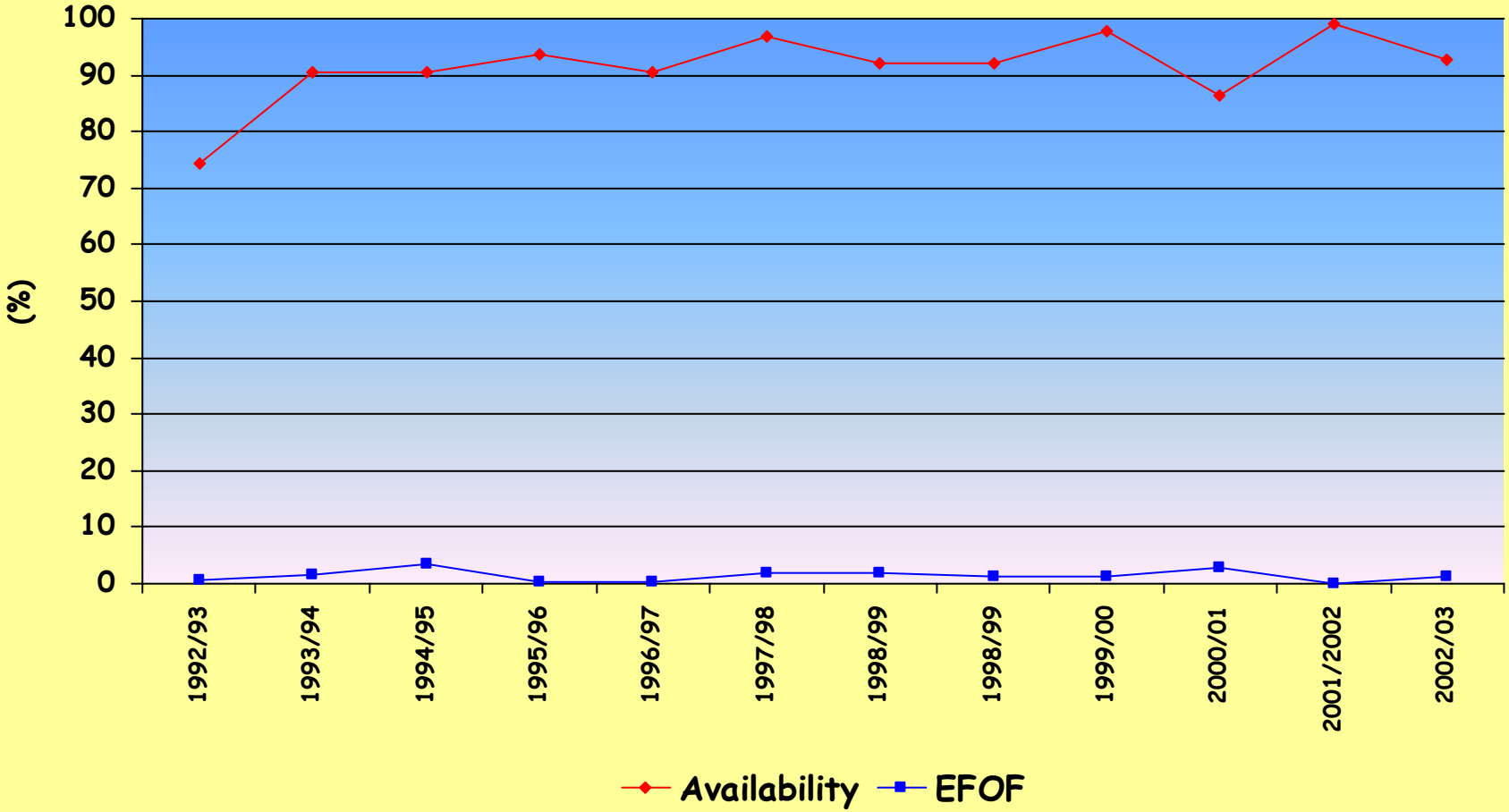
**Availability** = $\frac{\text{MWh max} - \text{MWh loss}}{\text{MWh max}} \times 100$

**Measures plant capability for energy generation**

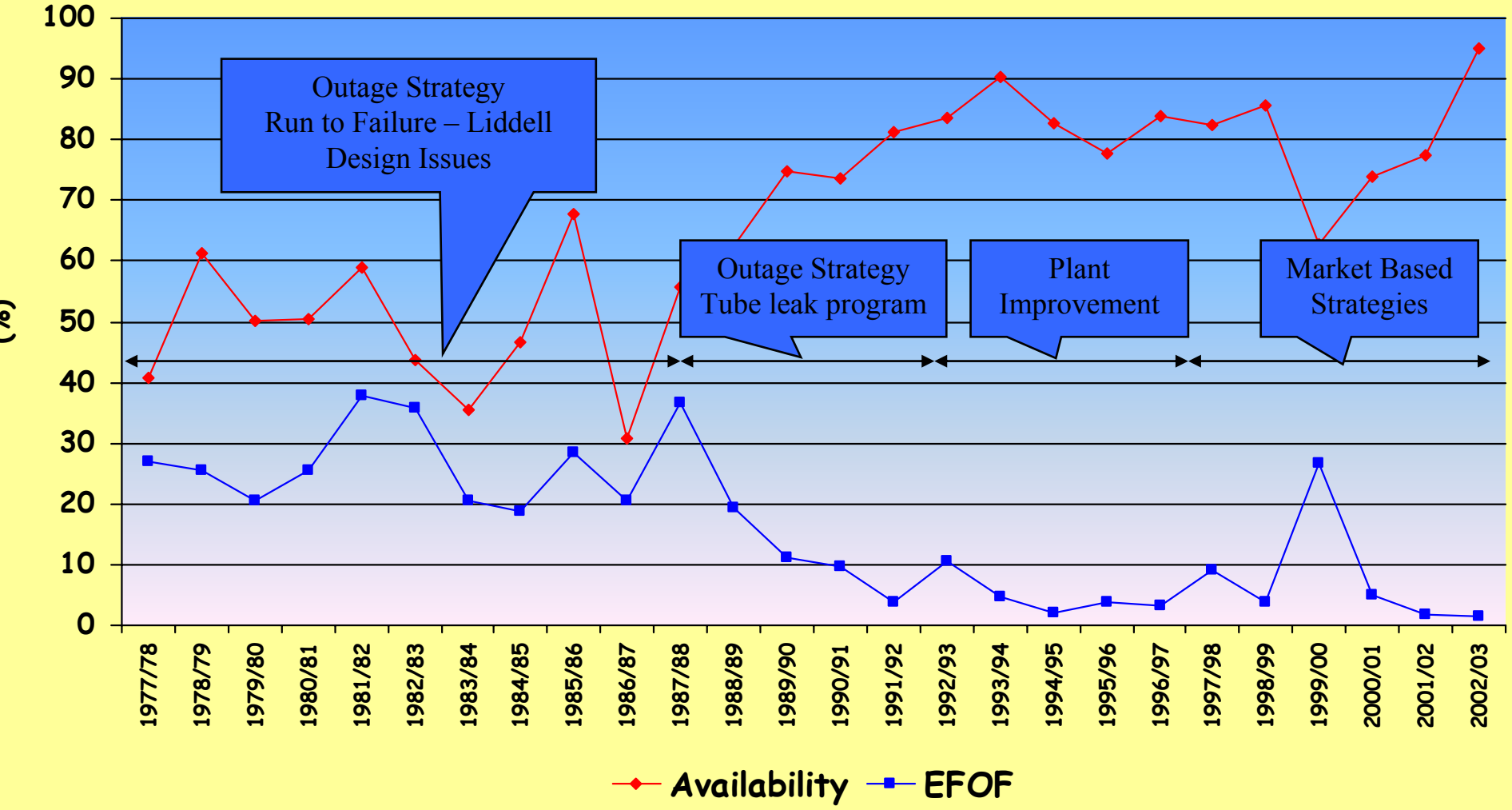
**EFOF** = All $\frac{\text{MWh losses forced \& partial}}{\text{MWh max}} \times `100$

**Equivalent forced outage factor measures % energy lost due to all forced outages**

# Mt. Piper Plant Performance



# Wallerawang Plant Performance



# Electricity Market -1996

- Business - making electricity for profit

- Plant Role - Available to produce revenue whenever required
  - Reliable service when producing revenue *
  - Maximize profit by reducing plant costs

# Improving Plant Performance

- Plant is a capability for generating revenue
- Analysis identifies improvement options
- Risk Management enables cost effective plant improvement
- Maintenance assures the capability

# Improving Plant Performance

**"Plant is a capability for generating revenue"**

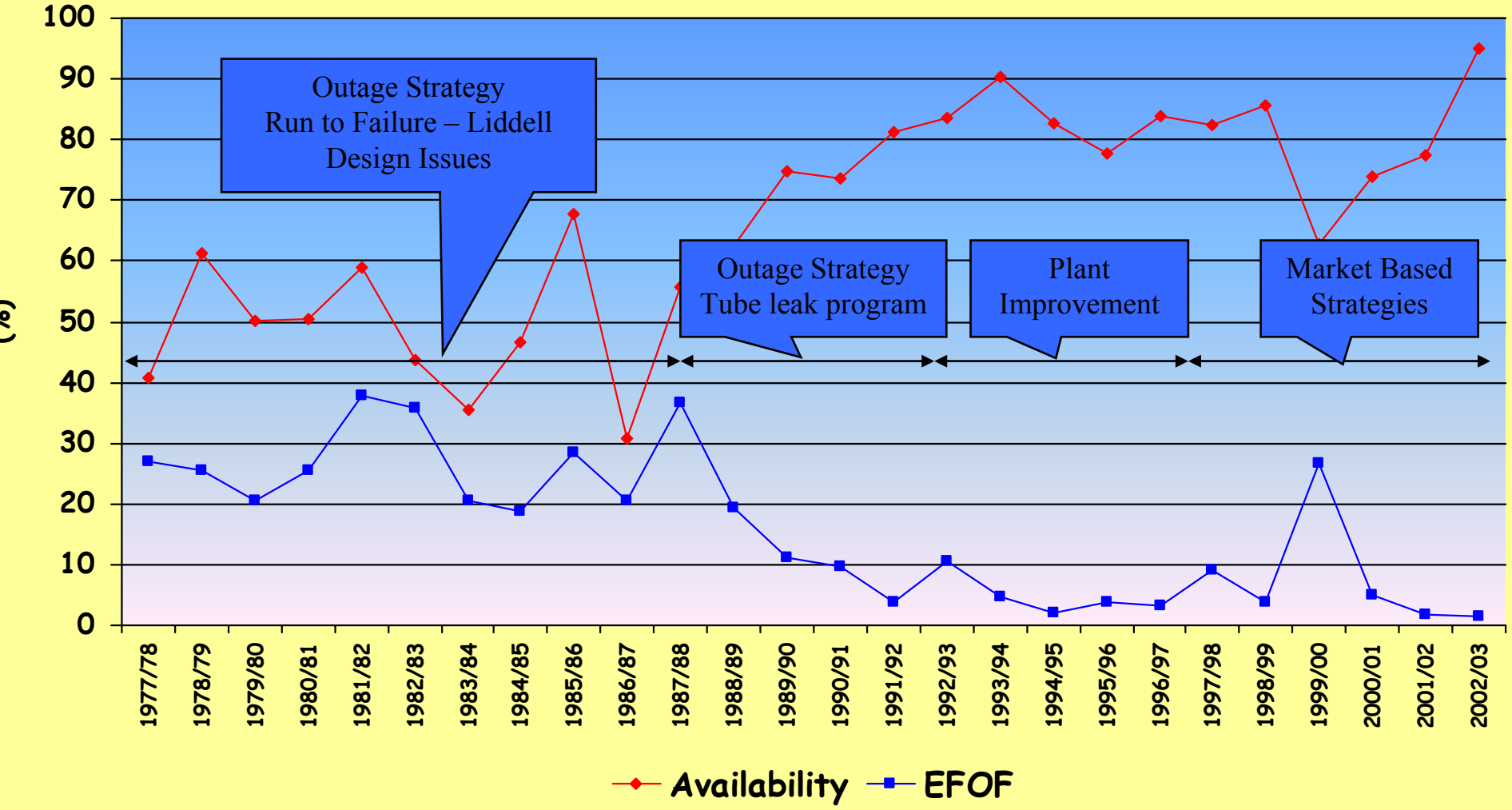
- Identify the primary business drivers
  - making electricity for profit
- Create supporting engineering drivers
  - Available, reliable, low cost

# Improving Plant Performance

**"Analysis identifies improvement options"**

- **Availability**
  - Minimize outage periods
  - Increase period between outages?
- **Unit Efficiency**
  - Greenhouse
  - Production Cost
- **Reliability**
  - Eliminate historical losses
  - Quantify risk of failures – prioritize & eliminate
  - High reliability demands pro-activity

# Wallerawang Plant Performance



# Improving Plant Performance

**"Risk Management enables cost effective plant improvement"**

- Quantify risk
  - Provides common language – engineering to business
- Risk determines corporate priorities
- Risk = probability x consequence
- Commercial packages available

# Improving Plant Performance

**Reducing plant costs**

- Engineering owns the “controllable costs”
- Focus on the plant improvement logic – cost reduction follows
- Financial evaluation of options
- No failures – no unexpected costs
- Unit efficiency improvements
- Benchmarking

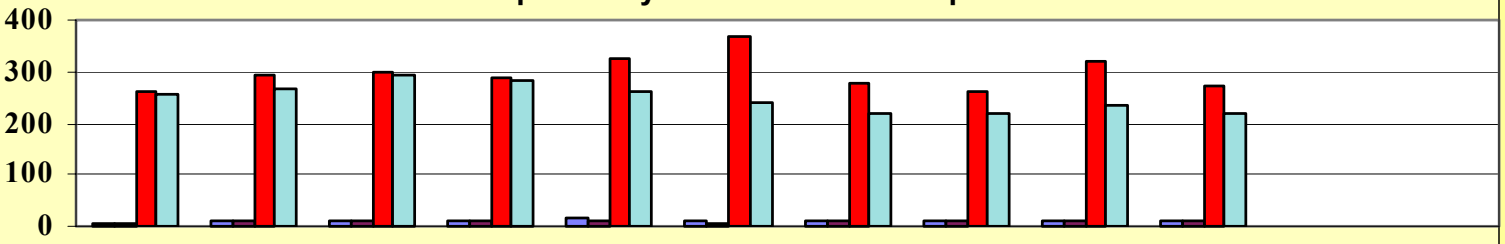
# Improving Plant Performance

**"Maintenance assures the capability"**

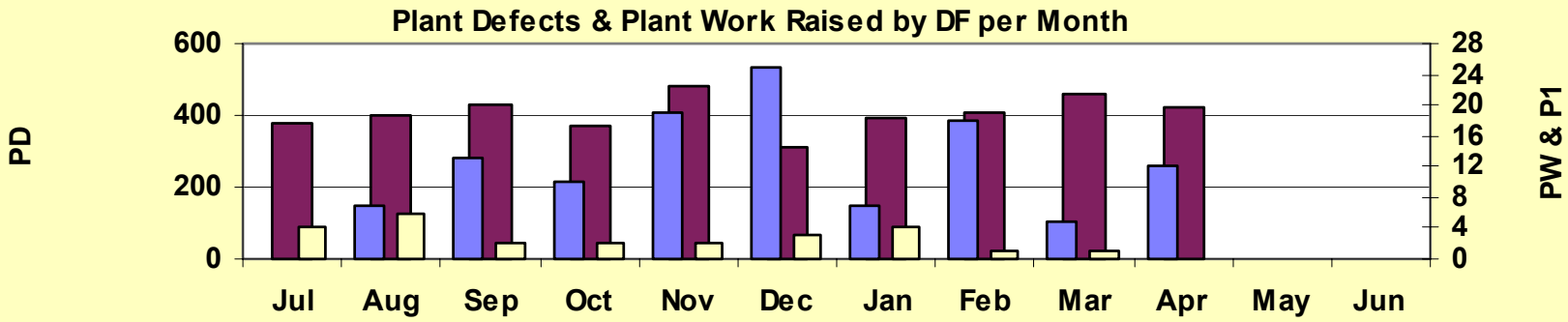
- **Preventive maintenance**
  - Routines in place?
  - Routines being completed?
  - Preventive controlling Corrective?
- **Corrective maintenance**
  - Defects raised & defects completed
  - Defects raised – trend
  - Backlog trend and content
- **Early warning for availability and reliability performance**

# Maintenance Measures

## Wallerawang



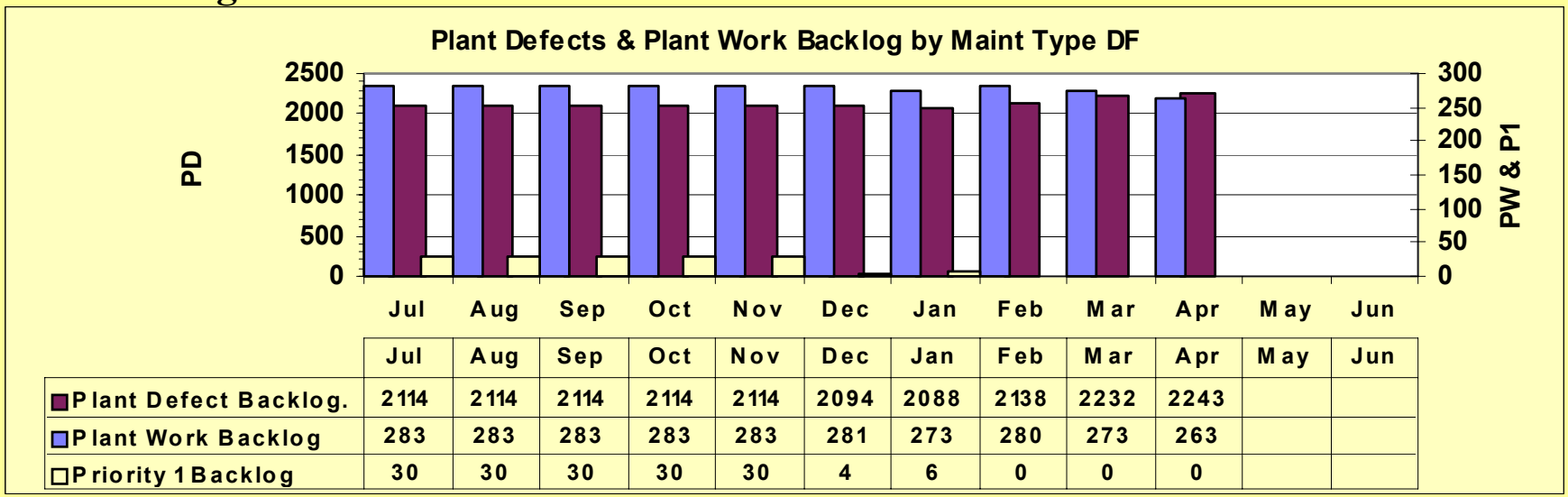

| | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OI by PSD Raised | 7 | 11 | 12 | 12 | 15 | 12 | 10 | 10 | 10 | 11 | | |
| OI by PSD Comp | 7 | 9 | 12 | 12 | 13 | 8 | 9 | 9 | 9 | 10 | | |
| PR by PSD Raised | 259 | 293 | 299 | 287 | 328 | 367 | 280 | 263 | 320 | 273 | | |
| PR by PSD Comp | 255 | 269 | 295 | 281 | 259 | 241 | 221 | 219 | 236 | 217 | | |



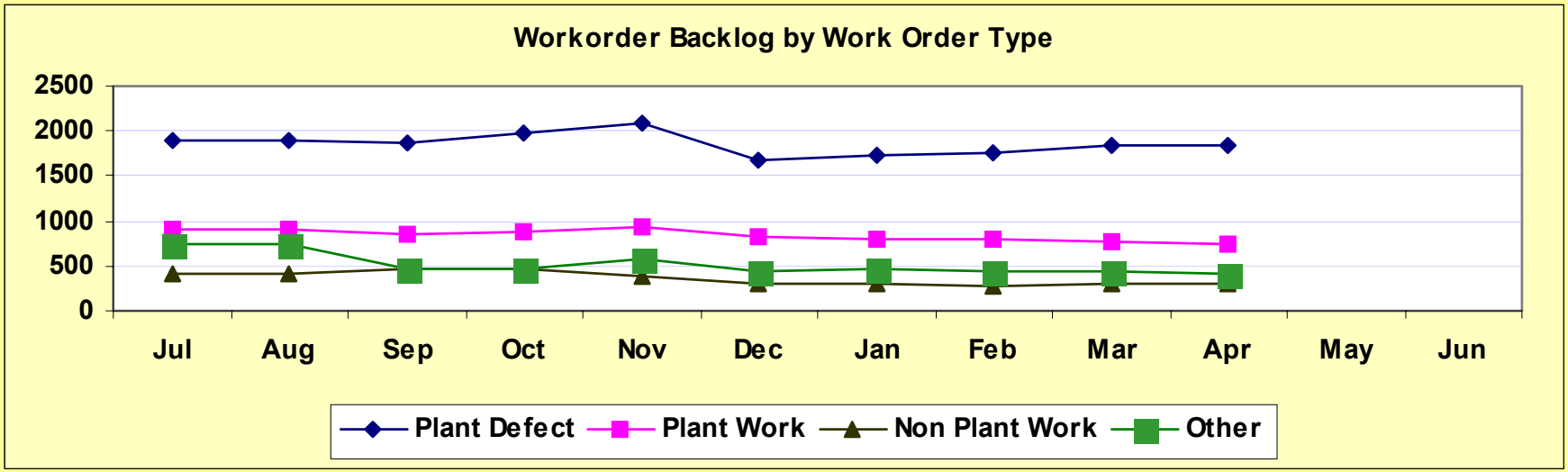

| | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant Defect Raised | 375 | 398 | 428 | 371 | 478 | 309 | 395 | 405 | 460 | 425 | | |
| Plant Work Raised | 0 | 7 | 13 | 10 | 19 | 25 | 7 | 18 | 5 | 12 | | |
| Priority 1 Raised | 4 | 6 | 2 | 2 | 2 | 3 | 4 | 1 | 1 | 0 | | |

# Maintenance Measures

**Wallerawang**




| | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant Defect Backlog. | 2114 | 2114 | 2114 | 2114 | 2114 | 2094 | 2088 | 2138 | 2232 | 2243 | | |
| Plant Work Backlog | 283 | 283 | 283 | 283 | 283 | 281 | 273 | 280 | 273 | 263 | | |
| Priority 1 Backlog | 30 | 30 | 30 | 30 | 30 | 4 | 6 | 0 | 0 | 0 | | |



# Strategies for All Plant

- Plant History
- Current Plant Conditions
- 10 Year Plan
  - Outage Strategy
  - Financial Plan
  - Budget Flexibility
  - Emerging Issues

# The Challenge is Greater!

- "Fixed costs" increase
- "Controllable Costs" become as fixed as "fixed costs"
  - Labour, material and expense
  - Outage and non-outage
- Controllable costs have more impact on the business
- Corporate Controls increase when pro-activity is required
- Benchmarking requires engineering interpretation
- Operating vs capital expenditure

# Early Warning Received …What Next?

- Analyse corrective maintenance and …..
- Convert to preventive maintenance
- Continue to Identify and Mitigate Risks
- Adopt a more conservative strategy